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Acute gout and the accident and emergency department

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INTRODUCTION

The classical description of Gout (*τὰ ποδαγρικά–ἠποδάγρα* 'the foot-pain'—Aristotle, 350 BC; Hippocrates, 430 BC) suggests that the earliest references were to the characteristic crystal synovitis of the first metatarsophalangeal joint. Antoni van Leuwenhoek published a beautiful drawing of urate crystals from a tophus in 1679. Since that time the term 'gout' has been applied to an increasingly vague and ill-defined collection of inflammatory diseases reaching a peak of confusion in the eighteenth century. By that time it had become almost entirely non-specific. There are innumerable articles on 'gout' and urate metabolism and a few about 'pseudo-gout' among them, but there are three or four which stand out as light-houses to the bewildered explorer: Professor George Nuki's review article of purine metabolism and crystal disease of connective tissue is interesting on its own account and has 135 references to the literature (Nuki, 1971). Alexander Gutman's review of the whole field of gout is masterly and equates 'gout' with a state of hyperuricaemia, however caused (Gutman, 1973). This assumption is almost universal. Edward W. Holmes's contribution however concedes that not all cases of acute gout present with a raised serum uric acid but goes on to say that 'hyperuricaemia is manifested at sometime in 98% of individuals with gout' (1977). Finally, a review article in the British Medical Journal describes contemporary work on the role of leucocytes in the pathogenesis of the acute attack of crystal synovitis (1973). 'Gout' is in essence a disorder of purine metabolism leading to deposits of urate crystal in the synovium, or peri-articular connective tissues. 'Pseudo-gout' or pyrophosphate arthropathy describes the acute synovitis due to deposition of calcium pyrophosphate in a joint. This article limits itself to those cases proved by crystalloscopy to be 'gout'. The term 'tophaceous disease' is used when urate deposition has produced tophi but not synovitis.

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METHOD

A method of small joint aspiration was developed using local infiltration of skin and joint capsule with lignocaine, and a 25G needle introduced under image-intensified fluoroscopy. The needle was left in the joint and abundant aspirate withdrawn into a dry, sterile syringe. If the amount of joint fluid was scanty Haemaccel was used to wash out any possible crystalline material (0·5 ml of eluent for an interphalangeal joint) and the aspirate submitted for crystalloscopy and gram-stain.

Polarized crystalloscopy of urate and calcium pyrophosphate demonstrates the difference in crystal morphology.

Compensated polarization is achieved by inserting a red compensator into the microscope; this demonstrates the difference in crystal birefringence. Urate crystals show strong negative birefringence; the crystals are yellow when parallel to the slow direction and blue when perpendicular. They are characteristically needle-shaped.

Calcium pyrophosphate crystals show weak positive birefringence; the crystals are blue when parallel to the slow direction and yellow when perpendicular.The crystals have the appearance of pleomorphic granules.

RESULTS

In a period of just over 6 years in a large rural accident and emergency unit 131 patients were recorded as presenting themselves with symptoms and signs suggestive of acute gout. This is 0·1% of the total of new patients seen during this period (130 000). These were diagnosed on the basis of two main presentations (1) acute inflammatory joint disease; or (2) acute tophaceous disease, both with intense pain, worse at night, accompanied by local heat, swelling, redness and tenderness/pain but no rise of body temperature. In chronic tophaceous disease skin breakdown was the main presenting sign.

In retrospect, 23 of these diagnoses were suspect. Of the 108 clinically probable diagnoses of gout a joint aspirate or tophaceous deposit was obtained of sufficient amount to allow polaroscopy in 38. Of those 38, 22 (58%) gave positive findings of monosodium urate crystals and 5 (13%) of calcium pyrophosphate crystals. In the remaining 11 (29%) crystalloscopy was negative for both types of crystal. Of the 22 crystalloscopies positive for urate 11 (50%) showed a normal serum 'uric acid' and 8 (36%) showed a rise of 'uric acid' in the serum. Three specimens were lost in transit.

Only one case (male aged 71) showed positive results for both crystal synovitis and acute tophaceous disease simultaneously and the uric acid level was normal at 282 μmol/l. Of the cases of purely tophaceous disease three were referred as acute bacterial abscesses by their family doctor and one was a member of the nursing staff in the unit who had a chronic painless lump on the radial border of an index finger exactly halfway between the metacarpo-phalangeal and proximal interphalangeal joints—as far from a joint as it is possible to get in a finger, and confined to the thickness of the skin. Relief of acute synovitis by lavage with Haemaccel was dramatic—all symptoms being relieved after the period of local anaesthesia for lavage and disappearing within 48 h. This effect was not entirely specific in that it has been noticed in patients with acute synovitis due to other causes than monosodium urate or calcium pyrophosphate.

Table 1 Summary of findings in 22 patients suffering from connective tissue disease due to deposition of monosodium urate crystals proved by crystalloscopy

Sex	Tophaceous disease	Crystal synovitis	Serum uric acid Raised	Serum uric acid Normal
M	✓		632	
F		✓		450
M		✓		467
F		✓	533	
M		✓		
F	✓			219
M	✓			414
M		✓	524	
M		✓		506
M		✓		513
M		✓		510
M		✓		419
M	✓			
F	✓		556	
M		✓		473
M		✓		
M	✓	✓		283
M		✓	611	
M	✓			422
M		✓	596	
F		✓	472	
F	✓		515	

Serum uric acid—upper limit of normal for men 520 μgm/l
upper limit of normal for women 450 μgm/l

Table 2 Summary of totals from Table 1

	No. of patients
Males	16
Females	6
Tophaceous disease	8
Crystal synovitis	15
Tophaceous disease and crystal synovitis	1
Raised serum uric acid	8
Normal serum uric acid	11
No result	3

Table 3 Observations from single patients, not included in preceding tables, giving dramatic point to the dissociation of the level of serum uric acid from the diagnosis of the type of crystal synovitis

Case	Clinical diagnosis	Crystalloscopy	Serum uric acid	Aspirate uric acid
243208 Male 69	subacute monoarthrosis 1st CMCJ	calcium pyrophosphate crystals only	543 μmol/l (520)	< 50 μmol/l

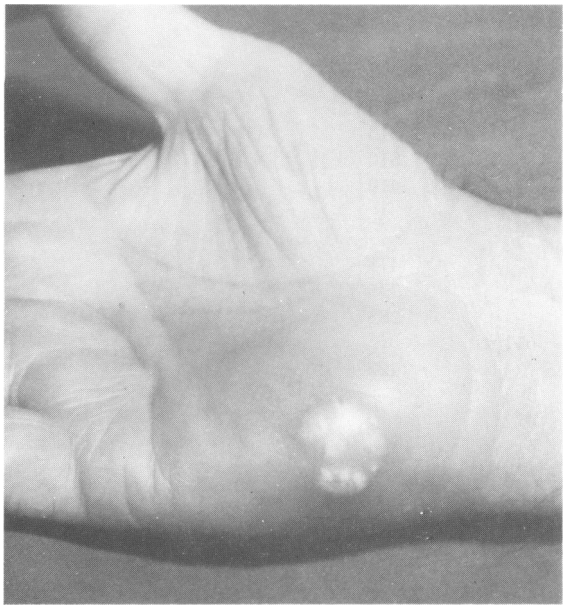

Fig. 1 Acute hypothenar tophus (48 h) presented as a bacterial abscess.

Fig. 2 Subacute pollical tophi (< 10 days) presented as a bacterial abscess.

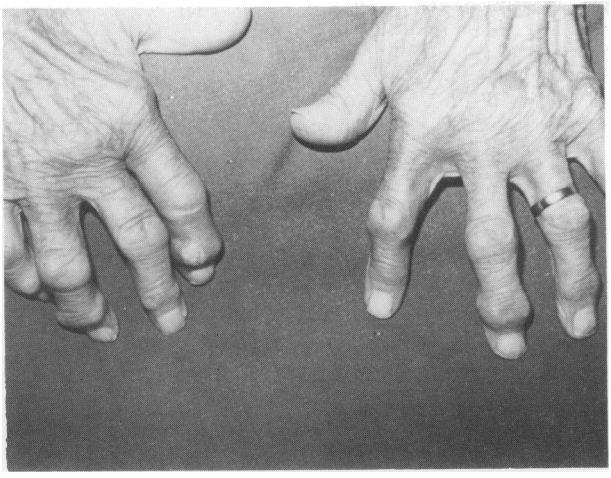

Fig. 3 Chronic tophaceous disease—the right index showing a tophus with severe pain and imminent skin breakdown.

Fig. 4 Close-up view of the same lesion.

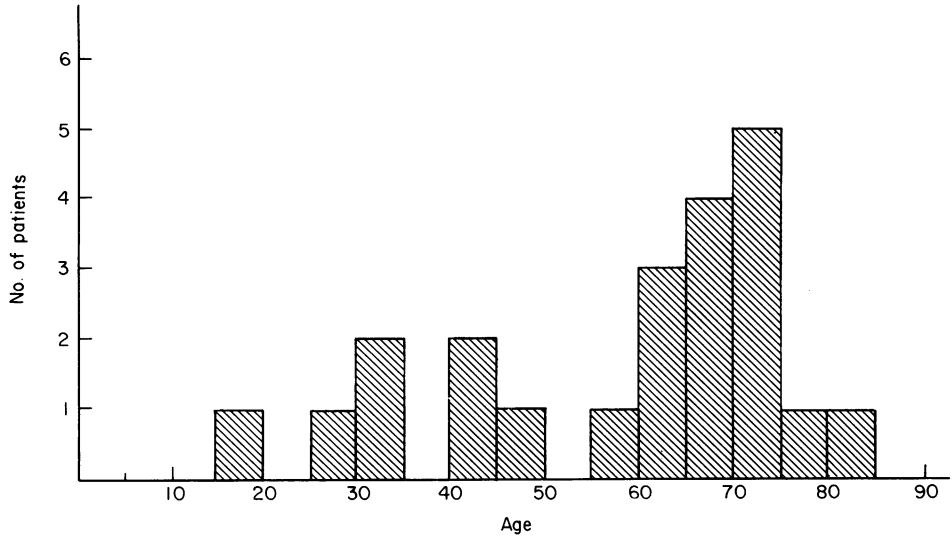

Fig. 5 Mean age of patients with disease of connective tissue due to deposition of monosodium urate crystals. When the serum uric acid was raised the mean age was 59.4 years (8 patients; 42%) and when normal was 57.4 years (11 patients; 58%).

DISCUSSION

As casualty officers we have three primary obligations to our patients, and one secondary one. Our first is to relieve symptoms; our second is to make a precise diagnosis (these two may have to exchange priorities according to circumstances); our third is to restore function, and the fourth (an obligation of the second order) is to prevent recurrence. These are still our ethical goals as they were in the time of Hippocrates and it ill becomes us to forget them. They apply whether our patient is suffering from cardiac arrest, circular saw injury, road traffic accident or gout. These results show that the diagnosis of gout in an accident and emergency department is a problem although not necessarily a common one. Distinguishing gout from acute sepsis and other acute monarthroses is difficult and a knowledge of the serum uric acid is not often helpful. Only the isolation of urate crystals is conclusive.

As if to cast the apple of discord more dramatically into the arena of clarification a recent patient presented with a sub-acute monarthrosis of the thumb, a raised serum uric acid and calcium pyrophosphate crystals in the aspirate. This polaroscopic finding was confirmed by biochemical micro-analysis. A sufficient source of confusion to the most devoted taxonomist. (Table 3). Aspiration can be a simple procedure for the accident and emergency department and we have particularly found the use of Haemaccel as an eluent most satisfactory. This has had the added advantage of rapid pain relief in most cases.

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